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*Search Page 8*

DATE: Saturday, July 12, 2003

<u>Set Name</u> side by side	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u> result set
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ</i>			
L7	L5 and @ay<1998	1	L7
L6	L3 and @ay<1998	0	L6
L5	L2 same autocorrelation	20	L5
L4	L3 same autocorrelation	0	L4
L3	L2 same fret	71	L3
L2	fluorescence correlation spectroscopy	286	L2
L1	fluorescence correlation spectrscopy	0	L1

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Search Paper 8

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=> FILE .PUB  
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FILE 'MEDLINE' ENTERED AT 13:53:58 ON 12 JUL 2003

FILE 'BIOSIS' ENTERED AT 13:53:58 ON 12 JUL 2003  
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=> s fluorescence correlation spectroscopy  
L1 669 FLUORESCENCE CORRELATION SPECTROSCOPY

=> s l1 and fret  
L2 13 L1 AND FRET

=> duplicate remove l2  
DUPLICATE PREFERENCE IS 'MEDLINE, BIOSIS'  
KEEP DUPLICATES FROM MORE THAN ONE FILE? Y/(N):n  
PROCESSING COMPLETED FOR L2  
L3 8 DUPLICATE REMOVE L2 (5 DUPLICATES REMOVED)

=> d 1-8 bib ab

L3 ANSWER 1 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
AN 2003:177363 BIOSIS  
DN PREV200300177363  
TI In vivo imaging.  
AU Misteli, Tom  
SO Methods (Orlando), (January 2003, 2003) Vol. 29, No. 1, pp. 1-2. print.  
ISSN: 1046-2023.  
DT Editorial  
LA English

L3 ANSWER 2 OF 8 MEDLINE DUPLICATE 1  
AN 2003246897 IN-PROCESS  
DN 22654364 PubMed ID: 12770909  
TI Single Molecule Detection of DNA Looping by NgoMIV Restriction  
Endonuclease.  
AU Katiliene Zivile; Katilius Evaldas; Woodbury Neal W  
CS Department of Chemistry and Biochemistry and the Center for the Study of  
Early Events in Photosynthesis, Arizona State University, Tempe, Arizona  
85287-1604.  
SO BIOPHYSICAL JOURNAL, (2003 Jun) 84 (6) 4053-61.  
Journal code: 0370626. ISSN: 0006-3495.  
CY United States  
DT Journal; Article; (JOURNAL ARTICLE)  
LA English  
FS IN-PROCESS; NONINDEXED; Priority Journals  
ED Entered STN: 20030529  
Last Updated on STN: 20030529  
AB Single molecule fluorescence resonance energy transfer (FRET)  
and fluorescence correlation spectroscopy  
were used to investigate DNA looping by NgoMIV restriction endonuclease.  
Using a linear double-stranded DNA (dsDNA) molecule labeled with a  
fluorescence donor molecule, Cy3, and fluorescence acceptor molecule, Cy5,  
and by varying the concentration of NgoMIV endonuclease from 0 to 3 x  
10(-6) M, it was possible to detect and determine diffusion properties of  
looped DNA/protein complexes. FRET efficiency distributions  
revealed a subpopulation of complexes with an energy transfer efficiency  
of 30%, which appeared upon addition of enzyme in the picomolar to

9/4 505 . A1 B537

nanomolar concentration range (using  $10^{-11}$  M dsDNA). The concentration dependence, fluorescence burst size analysis, and fluorescence correlation analysis were all consistent with this subpopulation arising from a sequence specific interaction between an individual enzyme and a DNA molecule. A 30% **FRET** efficiency corresponds to a distance of approximately 65 Å, which correlates well with the distance between the ends of the dsDNA molecule when bound to NgoMIV according to the crystal structure of this complex. Formation of the looped complexes was also evident in measurements of the diffusion times of freely diffusing DNA molecules with and without NgoMIV. At very high protein concentrations compared to the DNA concentration, **FRET** and **fluorescence correlation spectroscopy** results revealed the formation of larger DNA/protein complexes.

L3 ANSWER 3 OF 8 MEDLINE DUPLICATE 2  
 AN 2002212927 MEDLINE  
 DN 21927632 PubMed ID: 11929999  
 TI Mg<sup>2+</sup>-dependent conformational change of RNA studied by fluorescence correlation and **FRET** on immobilized single molecules.  
 AU Kim Harold D; Nienhaus G Ulrich; Ha Taekjip; Orr Jeffrey W; Williamson James R; Chu Steven  
 CS Department of Applied Physics and Physics, Stanford University, Stanford, CA 94305-4060, USA.  
 NC GM53757 (NIGMS)  
 SO PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, (2002 Apr 2) 99 (7) 4284-9.  
 Journal code: 7505876. ISSN: 0027-8424.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 200204  
 ED Entered STN: 20020413  
 Last Updated on STN: 20020426  
 Entered Medline: 20020425  
 AB **Fluorescence correlation spectroscopy** (FCS) of fluorescence resonant energy transfer (**FRET**) on immobilized individual fluorophores was used to study the Mg<sup>2+</sup>-facilitated conformational change of an RNA three-helix junction, a structural element that initiates the folding of the 30S ribosomal subunit. Transitions of the RNA junction between open and folded conformations resulted in fluctuations in fluorescence by **FRET**. Fluorescence fluctuations occurring between two **FRET** states on the millisecond time scale were found to be dependent on Mg<sup>2+</sup> and Na<sup>+</sup> concentrations. Correlation functions of the fluctuations were used to determine transition rates between the two conformations as a function of Mg<sup>2+</sup> or Na<sup>+</sup> concentration. Both the opening and folding rates were found to vary with changing salt conditions. Assuming specific binding of divalent ions to RNA, the Mg<sup>2+</sup> dependence of the observed rates cannot be explained by conformational change induced by Mg<sup>2+</sup> binding/unbinding, but is consistent with a model in which the intrinsic conformational change of the RNA junction is altered by uptake of Mg<sup>2+</sup> ion(s). This version of FCS/**FRET** on immobilized single molecules is demonstrated to be a powerful technique in the study of conformational dynamics of biomolecules over time scales ranging from microseconds to seconds.

L3 ANSWER 4 OF 8 MEDLINE DUPLICATE 3  
 AN 2003010503 MEDLINE  
 DN 22404570 PubMed ID: 12516859  
 TI Imaging protein-protein interactions in living cells.  
 AU Hink Mark A; Bisselin Ton; Visser Antonie J W G  
 CS MicroSpectroscopy Centre, Wageningen University, Dreijenlaan 3, 6703 HA Wageningen, The Netherlands.  
 SO PLANT MOLECULAR BIOLOGY, (2002 Dec) 50 (6) 871-83. Ref: 65

Journal code: 9106343. ISSN: 0167-4412.

CY Netherlands

DT Journal; Article; (JOURNAL ARTICLE)  
General Review; (REVIEW)  
(REVIEW, TUTORIAL)

LA English

FS Priority Journals

EM 200303

ED Entered STN: 20030109  
Last Updated on STN: 20030311  
Entered Medline: 20030310

AB The complex organization of plant cells makes it likely that the molecular behaviour of proteins in the test tube and the cell is different. For this reason, it is essential though a challenge to study proteins in their natural environment. Several innovative microspectroscopic approaches provide such possibilities, combining the high spatial resolution of microscopy with spectroscopic techniques to obtain information about the dynamical behaviour of molecules. Methods to visualize interaction can be based on **FRET** (fluorescence detected resonance energy transfer), for example in fluorescence lifetime imaging microscopy (FLIM). Another method is based on **fluorescence correlation spectroscopy** (FCS) by which the diffusion rate of single molecules can be determined, giving insight into whether a protein is part of a larger complex or not. Here, both **FRET**- and FCS-based approaches to study protein-protein interactions in vivo are reviewed.

L3 ANSWER 5 OF 8 MEDLINE DUPLICATE 4

AN 2002337357 MEDLINE

DN 22074795 PubMed ID: 12080140

TI Analysis of coupled bimolecular reaction kinetics and diffusion by two-color **fluorescence correlation spectroscopy**: enhanced resolution of kinetics by resonance energy transfer.

AU Hom Erik F Y; Verkman A S

CS The Graduate Group in Biophysics, Department of Medicine, Cardiovascular Research Institute, University of California, San Francisco, California 94143-0521, USA.. erikhom@cgl.ucsf.edu

NC EB00415 (NIBIB)

SO BIOPHYSICAL JOURNAL, (2002 Jul) 83 (1) 533-46.  
Journal code: 0370626. ISSN: 0006-3495.

CY United States

DT Journal; Article; (JOURNAL ARTICLE)

LA English

FS Priority Journals

EM 200212

ED Entered STN: 20020625  
Last Updated on STN: 20021228  
Entered Medline: 20021227

AB In two-color **fluorescence correlation spectroscopy** (TCFCS), the fluorescence intensities of two fluorescently-labeled species are cross-correlated over time and can be used to identify static and dynamic interactions. Generally, fluorophore labels are chosen that do not undergo Forster resonance energy transfer (**FRET**). Here, a general TCFCS theory is presented that accounts for the possibility of **FRET** between reactants in the reversible bimolecular reaction, [reaction: see text] where  $k(f)$  and  $k(b)$  are forward and reverse rate constants, respectively (dissociation constant  $K(d) = k(b)/k(f)$ ). Using this theory, we systematically investigated the influence on the correlation function of **FRET**, reaction rates, reactant concentrations, diffusion, and component visibility. For reactants of comparable size and an energy-transfer efficiency of approximately 90%, experimentally measurable cross-correlation functions should be sensitive to reaction kinetics for  $K(d) > 10(-8)$  M and  $k(f) > \text{or} = 10(7)$  M<sup>-1</sup>s<sup>-1</sup>. Measured auto-correlation functions

corresponding to donor and acceptor labels are generally less sensitive to reaction kinetics, although for the acceptor, this sensitivity increases as the visibility of the donor increases relative to the acceptor. In the absence of **FRET** or a significant hydrodynamic difference between reactant species, there is little effect of reaction kinetics on the shape of auto- and cross-correlation functions. Our results suggest that a subset of biologically relevant association-dissociation kinetics can be measured by TCFCS and that **FRET** can be advantageous in enhancing these effects.

L3 ANSWER 6 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
 AN 2002:508600 BIOSIS  
 DN PREV200200508600  
 TI Detection trends in high throughput screening.  
 AU Westerfeld, John G. (1)  
 CS (1) BioWhittaker, Inc., Walkersville, MD, 21793:  
 John.Westerfeld@biowhittaker.com USA  
 SO Analytical and Bioanalytical Chemistry, (January, 2002) Vol. 372, No. 1,  
 pp. 43. <http://link.springer.de/journals/abc>. print.  
 ISSN: 1618-2642.  
 DT Article  
 LA English

L3 ANSWER 7 OF 8 MEDLINE DUPLICATE 5  
 AN 2001290536 MEDLINE  
 DN 21267519 PubMed ID: 11373302  
 TI GFP imaging: methodology and application to investigate cellular  
 compartmentation in plants.  
 AU Hanson M R; Kohler R H  
 CS Department of Molecular Biology and Genetics, Cornell University,  
 Biotechnology Building, Ithaca, NY 14853, USA.. mrh5@cornell.edu  
 SO JOURNAL OF EXPERIMENTAL BOTANY, (2001 Apr) 52 (356) 529-39. Ref: 102  
 Journal code: 9882906. ISSN: 0022-0957.  
 CY England: United Kingdom  
 DT Journal; Article; (JOURNAL ARTICLE)  
 General Review; (REVIEW)  
 (REVIEW, TUTORIAL)  
 LA English  
 FS Priority Journals  
 EM 200108  
 ED Entered STN: 20010806  
 Last Updated on STN: 20010806  
 Entered Medline: 20010802  
 AB The cloning of the jellyfish gfp (green fluorescent protein) gene and its  
 alteration for expression in subcellular locations in transformed plant  
 cells have resulted in new views of intracellular organization and  
 dynamics. Fusions of GFP with entire proteins of known or unknown  
 function have shown where the proteins are located and whether the  
 proteins move from one compartment to another. GFP and variants with  
 different spectral properties have been deliberately targeted to separate  
 compartments to determine their size, shape, mobility, and dynamic changes  
 during development or environmental response. Fluorescence Resonance  
 Energy Transfer (**FRET**) between GFP variants can discern protein/  
 protein interactions. GFP has been used as a sensor to detect changes or  
 differences in calcium, pH, voltage, metal, and enzyme activity.  
 Photobleaching and photoactivation of GFP as well as **fluorescence  
 correlation spectroscopy** can measure rates of diffusion  
 and movement of GFP within or between compartments. This review covers  
 past applications of these methods as well as promising developments in  
 GFP imaging for understanding the functional organization of plant cells.

L3 ANSWER 8 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
 AN 2001:448345 BIOSIS  
 DN PREV200100448345



TI **Fluorescence correlation spectroscopy** for in  
 vivo monitoring of resistance mechanisms.  
 AU Schots, A. (1); Dees, R. (1); Goverse, A.; Borst, J. W. (1); Bakker, J.;  
 Visser, A. J. W. G.  
 CS (1) Lab. of Molecular Recognition and Antibody Technology, Wageningen  
 University, Wageningen Netherlands  
 SO Phytopathology, (June, 2001) Vol. 91, No. 6 Supplement, pp. S143. print.  
 Meeting Info.: Joint Meeting of the American Phytopathological Society,  
 the Mycological Society of America, and the Society of Nematologists Salt  
 Lake City, Utah, USA August 25-29, 2001  
 ISSN: 0031-949X.  
 DT Conference  
 LA English  
 SL English  
 AB Using **fluorescence correlation spectroscopy**  
 (FCS) molecular interactions at the single-molecule level can be  
 investigated. Molecular binding events and molecular processing can be  
 measured. Important techniques in this respects are fluorescence resonance  
 energy transfer (**FRET**) measured by fluorescence lifetime imaging  
 microscopy (FLIM) and two colour fluorescence cross-correlation  
 spectroscopy (FCCS). Using multiphoton lasers these techniques are now  
 also applicable for measurements in plant cells.. To gain insight in  
 protein interactions usually protein fusions with yellow (YFP) and cyan  
 (CFP) variants of the green fluorescent protein are used. These  
 technologies are applied to gain insight in the resistance mechanism of  
 the homologous resistance genes Rx and conferring resistance to potato  
 virus X and Globodera pallida.

=> d his

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FILE 'MEDLINE, BIOSIS' ENTERED AT 13:53:58 ON 12 JUL 2003

L1 669 S FLUORESCENCE CORRELATION SPECTROSCOPY  
 L2 13 S L1 AND FRET  
 L3 8 DUPLICATE REMOVE L2 (5 DUPLICATES REMOVED)

=> s l1 and autocorrelation

L4 88 L1 AND AUTOCORRELATION

=> s l4 and py<1998

L5 30 L4 AND PY<1998

=> duplicate remove l5

DUPLICATE PREFERENCE IS 'MEDLINE, BIOSIS'

KEEP DUPLICATES FROM MORE THAN ONE FILE? Y/(N):n

PROCESSING COMPLETED FOR L5

L6 19 DUPLICATE REMOVE L5 (11 DUPLICATES REMOVED)

=> d 1-19 bib ab

L6 ANSWER 1 OF 19 MEDLINE DUPLICATE 1  
 AN 97237213 MEDLINE  
 DN 97237213 PubMed ID: 9083691  
 TI Dual-color fluorescence cross-correlation spectroscopy for multicomponent  
 diffusional analysis in solution.  
 CM Comment in: Biophys J. 1997 Apr;72(4):1487-8  
 AU Schwille P; Meyer-Almes F J; Rigler R  
 CS Department of Biochemical Kinetics, Max Planck Institute for Biophysical  
 Chemistry, Gottingen, Germany.. pschwil@gwdg.de  
 SO BIOPHYSICAL JOURNAL, (1997 Apr) 72 (4) 1878-86.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States

DT Journal; Article; (JOURNAL ARTICLE)  
LA English  
FS Priority Journals  
EM 199709  
ED Entered STN: 19970916

Last Updated on STN: 19970916  
Entered Medline: 19970902

AB The present paper describes a new experimental scheme for following diffusion and chemical reaction systems of fluorescently labeled molecules in the nanomolar concentration range by fluorescence correlation analysis. In the dual-color fluorescence cross-correlation spectroscopy provided here, the concentration and diffusion characteristics of two fluorescent species in solution as well as their reaction product can be followed in parallel. By using two differently labeled reaction partners, the selectivity to investigate the temporal evolution of reaction product is significantly increased compared to ordinary one-color fluorescence **autocorrelation** systems. Here we develop the theoretical and experimental basis for carrying out measurements in a confocal dual-beam **fluorescence correlation spectroscopy** setup and discuss conditions that are favorable for cross-correlation analysis. The measurement principle is explained for carrying out DNA-DNA renaturation kinetics with two differently labeled complementary strands. The concentration of the reaction product can be directly determined from the cross-correlation amplitude.

L6 ANSWER 2 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.

AN 1997:409481 BIOSIS

DN PREV199799701524

TI Exonuclease degradation of DNA studied by **fluorescence correlation spectroscopy**.

AU Foldes-Papp, Zeno; Thyberg, Per; Bjorling, Sofie; Holmgren, Arne; Rigler, Rudolf

CS Dep. Med. Biochem. and Biophysics, Karolinska Inst., S-17177 Stockholm Sweden

SO Nucleosides & Nucleotides, (1997) Vol. 16, No. 5-6, pp. 781-787.  
ISSN: 0732-8311.

DT Article

LA English

AB Here we developed an accurate method for kinetic analysis of enzymatic degradation processes of double and/or single-stranded DNA/oligonucleotides using fluorescent reporter dyes. 217-bp DNA fragments were produced by polymerase chain reaction and cleaved by the 3' to 5' exonuclease activity of T7-DNA polymerase. The analysis of the products was performed by **Fluorescence Correlation Spectroscopy** measuring **autocorrelation** amplitudes and diffusion times. We give proof of (i) complete enzymatic degradation, (ii) retardation of complete enzymatic degradation by internally labelled Rhodamine-4-nucleotides and Cy5-nucleotides, respectively. Data evaluation by global analysis indicated first-order reaction kinetics with full-length DNA and free fluorescent nucleotides in the time window of measurements used.

L6 ANSWER 3 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.

AN 1997:509788 BIOSIS

DN PREV199799808991

TI Kinetic investigations by **fluorescence correlation spectroscopy**: The analytical and diagnostic potential of diffusion studies.

AU Schwille, Petra (1); Bieschke, Jan; Oehlenschlaeger, Frank

CS (1) Max-Planck-Inst. Biophysikalische Chem., Abteilung Biochemische Kinetik, D-37077 Goettingen Germany

SO Biophysical Chemistry, (1997) Vol. 66, No. 2-3, pp. 211-228.  
ISSN: 0301-4622.

DT General Review



LA English  
AB This review demonstrates the large analytical and diagnostic potential of **fluorescence correlation spectroscopy** applied to freely diffusing biomolecules in solution. All applications discussed here in detail are based on changes in the diffusion characteristics of fluorescently labeled complementary strands of nucleic acids when they associate. However, the principle of the measurement can be extended to many different reactions with characteristic association times between several minutes up to several hours. If the reaction significantly affects the diffusion constants of at least one partner, single-color **autocorrelation** analysis is sufficient to extract kinetic parameters. If the observed binding process has only a moderate effect on diffusion coefficients, the detection selectivity and sensitivity can be improved by dual-color cross-correlation analysis. Finally, we show that diffusional analysis on the single-molecule level even opens up diagnostic applications, such as the detection of minute amounts of infectious agents like HIV-1 viruses in blood.

L6 ANSWER 4 OF 19 MEDLINE DUPLICATE 2  
AN 96248303 MEDLINE  
DN 96248303 PubMed ID: 8785359  
TI Imaging **fluorescence correlation spectroscopy**  
: nonuniform IgE distributions on planar membranes.  
AU Huang Z; Thompson N L  
CS Department of Chemistry, University of North Carolina, Chapel Hill  
27599-3290, USA.  
NC GM-37145 (NIGMS)  
SO BIOPHYSICAL JOURNAL, (1996 Apr) 70 (4) 2001-7.  
Journal code: 0370626. ISSN: 0006-3495.  
CY United States  
DT Journal; Article; (JOURNAL ARTICLE)  
LA English  
FS Priority Journals  
EM 199609  
ED Entered STN: 19961008  
Last Updated on STN: 19961008  
Entered Medline: 19960920

AB **Fluorescence correlation spectroscopy** is useful for detecting and characterizing molecular clusters that are smaller than or approximately equal to optical resolution in size. Here, we report the development of an approach in which the pixel-to-pixel fluorescence fluctuations from a single fluorescence image are spatially autocorrelated. In these measurements, tetramethylrhodamine-labeled, anti-trinitrophenyl IgE antibodies were specifically bound to substrate-supported planar membranes composed of trinitrophenyl-aminocaproyldipalmitoylphosphatidylethanolamine and dipalmitoylphosphatidylcholine. The antibody-coated membranes were illuminated with the evanescent field from a totally internally reflected laser beam, and the fluorescence arising from the IgE-coated membranes was recorded with a cooled CCD camera. The image was corrected for the elliptical Gaussian shape of the evanescent illumination after background subtraction. The spatial **autocorrelation** functions of the resulting images generated two useful parameters: the extrapolated initial values, which were related to the average cluster intensity and density; and the correlation distances, which were related to the average cluster size. These parameters varied with the IgE density, and unlabeled polyclonal anti-IgE enhanced the nonuniform IgE distributions. The **autocorrelation** functions calculated from images of planar membranes containing fluorescently labeled lipids rather than bound, labeled IgE demonstrated that the spatial nonuniformities were prominent only in the presence of IgE. Fluorescent beads were used to demonstrate the principles and the methods.

L6 ANSWER 5 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.

AN 1996:142313 BIOSIS  
 DN PREV199698714448  
 TI High order fluorescence fluctuation **autocorrelation** with imaging  
**fluorescence correlation spectroscopy**.  
 AU Vanden Broek, Willem; Huang, Zhengping; Thompson, Nancy L.  
 CS Dep. Chem., Univ. North Carolina, Chapel Hill, NC 27599-3290 USA  
 SO Biophysical Journal, (1996) Vol. 70, No. 2 PART 2, pp. A428.  
 Meeting Info.: 40th Annual Meeting of the Biophysical Society Baltimore,  
 Maryland, USA February 17-21, 1996  
 ISSN: 0006-3495.  
 DT Conference  
 LA English

L6 ANSWER 6 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
 AN 1993:495855 BIOSIS  
 DN PREV199396119862  
 TI **Fluorescence correlation spectroscopy** with  
 high count rate and low background: Analysis of translational diffusion.  
 AU Rigler, R. (1); Mets, U.; Widengren, J.; Kask, P.  
 CS (1) Karolinska Inst., Dep. Medical Biophysics, S-10401 Stockholm Sweden  
 SO European Biophysics Journal, (1993) Vol. 22, No. 3, pp. 169-175.  
 ISSN: 0175-7571.  
 DT Article  
 LA English  
 AB An epi-illuminated microscope configuration for use in  
**fluorescence correlation spectroscopy** in bulk  
 solutions has been analyzed. For determining the effective sample  
 dimensions the spatial distribution of the molecule detection efficiency  
 has been computed and conditions for achieving quasi-cylindrical sample  
 shape have been derived. Model experiments on translational diffusion of  
 rhodamine 6G have been carried out using strong focusing of the laser  
 beam, small pinhole size and an avalanche photodiode in single photon  
 counting mode as the detector. A considerable decrease in background light  
 intensity and measurement time has been observed. The background light is  
 40 times weaker than the fluorescence signal from one molecule of Rh6G,  
 and the correlation function with signal-to-noise ratio of 150 can be  
 collected in 1 second. The effect of the shape of the sample volume on the  
**autocorrelation** function has been discussed.

L6 ANSWER 7 OF 19 MEDLINE DUPLICATE 3  
 AN 93144608 MEDLINE  
 DN 93144608 PubMed ID: 1489907  
 TI Motion of actin filaments in the presence of myosin heads and ATP.  
 AU Burlacu S; Borejdo J  
 CS Baylor Research Institute, Baylor University Medical Center, Dallas, Texas  
 75226.  
 NC AR-40095-01 (NIAMS)  
 SO BIOPHYSICAL JOURNAL, (1992 Dec) 63 (6) 1471-82.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 199303  
 ED Entered STN: 19930312  
 Last Updated on STN: 19930312  
 Entered Medline: 19930301  
 AB We measured, by **fluorescence correlation  
 spectroscopy**, the motion of actin filaments in solution during  
 hydrolysis of ATP by acto-heavy meromyosin (acto-HMM). The method relies  
 on the fact that the intensity of fluorescence fluctuates as fluorescently  
 labeled actin filaments enter and leave a small sample volume. The  
 rapidity of these number fluctuations is characterized by the  
**autocorrelation** function, which decays to 0 in time that is

related to the average velocity of translation of filaments. The time of decay of the **autocorrelation** function of bare actin filaments in solution was  $10.59 \pm 0.85$  s. Strongly bound (rigor) heads slowed down the diffusion. Direct observation of filaments under an optical microscope showed that addition of HMM did not change the average length or flexibility of actin filaments, suggesting that the decrease in diffusion was not due to a HMM-induced change in the shape of filaments. Rather, slowing down of translational motion was caused by an increase in the volume of the diffusing complex. Surprisingly, the addition of ATP to acto-HMM accelerated the motion of actin filaments. The acceleration was the greatest at the low molar ratios of HMM:actin. Direct observation of filaments under an optical microscope showed that in the presence of ATP the average length of filaments did not change and that the filaments became stiffer, suggesting that acceleration of diffusion was not due to an ATP-induced increase in flexibility of filaments. These results show that some of the energy of splitting of ATP is impaired to actin filaments and suggest that  $0.06 \pm 0.02$  of HMM interferes with the diffusion of actin filaments during hydrolysis of ATP.

L6 ANSWER 8 OF 19 MEDLINE DUPLICATE 4  
 AN 93042726 MEDLINE  
 DN 93042726 PubMed ID: 1420920  
 TI Studies on the structure of actin gels using time correlation spectroscopy of fluorescent beads.  
 AU Qian H; Elson E L; Frieden C  
 CS Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine, St. Louis, Missouri 63110.  
 NC DK-13332 (NIDDK)  
 GM-38838 (NIGMS)  
 SO BIOPHYSICAL JOURNAL, (1992 Oct) 63 (4) 1000-10.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 199212  
 ED Entered STN: 19930122  
 Last Updated on STN: 19970203  
 Entered Medline: 19921211  
 AB **Fluorescence correlation spectroscopy** (FCS) has been used to measure the diffusion of fluorescently labeled beads in solutions of polymerized actin or buffer. The results, obtained at actin concentrations of 1 mg/ml, show that small beads (0.09 micron in diameter) diffuse nearly as rapidly in the actin gel as in buffer, whereas the largest beads tested (0.5 micron in diameter) are immobilized. Measured **autocorrelation** times for motions of beads with intermediate sizes show that the diffusion is retarded (relative to buffer) and that the time behavior cannot be represented as a single diffusive process. In addition to the retarded diffusion observed over distances  $> 1$  micron, 0.23-micron beads also show a faster motion over smaller distances. Based on the measured rate of this faster motion, we estimate that the beads may be constrained within a cage approximately 0.67 micron on a side, equal to a filament length of approximately 250 subunits. **Fluorescence correlation spectroscopy** measurements made in the same small spot (radius of 1.4 microns) of the gel vary over time. From the variations of both the **autocorrelation** functions and the mean fluorescence, we conclude that, corresponding to a spatial scale of 1.4 microns, the actin gel is a dynamic structure with slow rearrangement of the gel occurring over periods of 20-50 s at 21-22 degrees C. This rearrangement may result from local reorganization of the actin matrix. Data for the retardation of beads by the actin gel are consistent with a detailed theory of the diffusion of particles through solutions of rigid rods that have longitudinal diffusion coefficients much less than that of the particles (Ogston, A. G., B. N. Preston, and J. D. Wells. 1973.

- L6 ANSWER 9 OF 19 MEDLINE DUPLICATE 5  
AN 90344987 MEDLINE  
DN 90344987 PubMed ID: 2383634  
TI On the measurement of particle number and mobility in nonideal solutions by **fluorescence correlation spectroscopy**.  
AU Abney J R; Scalettar B A; Hackenbrock C R  
CS Department of Cell Biology and Anatomy, University of North Carolina, Chapel Hill 27599-7090.  
SO BIOPHYSICAL JOURNAL, (1990 Jul) 58 (1) 261-5.  
Journal code: 0370626. ISSN: 0006-3495.  
CY United States  
DT Journal; Article; (JOURNAL ARTICLE)  
LA English  
FS Priority Journals  
EM 199009  
ED Entered STN: 19901026  
Last Updated on STN: 19901026  
Entered Medline: 19900920  
AB Interparticle interactions are incorporated into the theoretical description of the initial amplitude,  $G(0)$ , of the normalized **fluorescence correlation spectroscopy autocorrelation** function. Measurements of particle number, aggregate size, and interaction-dependent diffusion are then analyzed in the context of this generalized theory. It is shown that the neglect of interactions can introduce order-of-magnitude errors into estimates of particle number and aggregate size. It is also shown that measurement of  $G(0)$  provides an essentially unique method for testing the validity of theories of interaction-dependent membrane protein diffusion.
- L6 ANSWER 10 OF 19 MEDLINE DUPLICATE 6  
AN 91198461 MEDLINE  
DN 91198461 PubMed ID: 2085652  
TI On the statistics of **fluorescence correlation spectroscopy**.  
AU Qian H  
CS Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine, St. Louis, MO 63110.  
NC GM38838 (NIGMS)  
SO BIOPHYSICAL CHEMISTRY, (1990 Oct) 38 (1-2) 49-57.  
Journal code: 0403171. ISSN: 0301-4622.  
CY Netherlands  
DT Journal; Article; (JOURNAL ARTICLE)  
LA English  
FS Priority Journals  
EM 199105  
ED Entered STN: 19910607  
Last Updated on STN: 19910607  
Entered Medline: 19910520  
AB I present a detailed statistical analysis of **fluorescence correlation spectroscopy** (FCS) which is a natural extension of an early work. This analysis more realistically takes account of the following issues. (1) A spatial Gaussian laser excitation of fluorescence, (2) the effect of a small number of fluorescent molecules in the observation volume, (3) the shot noise effect due to random emission of fluorescent photons, and (4) a hyperbolic form for the fluorescence **autocorrelation** function obtained in the case of diffusion. Based on these assumptions, the results differ from the earlier work in several respects, in particular, the dependence of the signal-to-noise ratio on sample concentration and the understanding of shot noise in fluorescence fluctuation moments.
- L6 ANSWER 11 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.

AN 1989:197075 BIOSIS  
 DN BR36:97524  
 TI CONCENTRATIONS AND FLUORESCENT YIELDS OF DISTINCT CHEMICAL COMPONENTS IN MIXTURES MEASURED BY HIGH ORDER **AUTOCORRELATION** IN **FLUORESCENCE CORRELATION SPECTROSCOPY**.  
 AU PALMER A G III; THOMPSON N L  
 CS DEP. CHEM., UNIV. N.C., CHAPEL HILL, N.C. 27599-3290, USA.  
 SO THIRTY-THIRD ANNUAL MEETING OF THE BIOPHYSICAL SOCIETY, CINCINNATI, OHIO, USA, FEBRUARY 12-16, 1989. BIOPHYS J. (1989) 55 (2 PART 2), 191A.  
 CODEN: BIOJAU. ISSN: 0006-3495.  
 DT Conference  
 FS BR; OLD  
 LA English

L6 ANSWER 12 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
 AN 1988:213088 BIOSIS  
 DN BR34:106098  
 TI MOLECULAR AGGREGATION CHARACTERIZED BY HIGH ORDER **AUTOCORRELATION** IN **FLUORESCENCE CORRELATION SPECTROSCOPY**.  
 AU PALMER A G III; THOMPSON N L  
 CS DEP. CHEM., UNIV. NORTH CAROLINA AT CHAPEL HILL, CHAPEL, HILL, NC 27599-3290.  
 SO THIRTY-SECOND ANNUAL MEETING OF THE BIOPHYSICAL SOCIETY, PHOENIX, ARIZONA, USA, FEBRUARY 28-MARCH 3, 1988. BIOPHYS J. (1988) 53 (2 PART 2), 478A.  
 CODEN: BIOJAU. ISSN: 0006-3495.  
 DT Conference  
 FS BR; OLD  
 LA English

L6 ANSWER 13 OF 19 MEDLINE DUPLICATE 7  
 AN 87157946 MEDLINE  
 DN 87157946 PubMed ID: 3828464  
 TI Theory of sample translation in **fluorescence correlation spectroscopy**.  
 AU Palmer A G 3rd; Thompson N L  
 NC GM-37145 (NIGMS)  
 SO BIOPHYSICAL JOURNAL, (1987 Feb) 51 (2) 339-43.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198705  
 ED Entered STN: 19900303  
 Last Updated on STN: 19970203  
 Entered Medline: 19870504  
 AB New applications of the technique of **fluorescence correlation spectroscopy** (FCS) require lateral translation of the sample through a focused laser beam (Peterson, N.O., D.C. Johnson, and M.J. Schlesinger, 1986, Biophys. J., 49:817-820). Here, the effect of sample translation on the shape of the FCS **autocorrelation** function is examined in general. It is found that if the lateral diffusion coefficients of the fluorescent species obey certain conditions, then the FCS **autocorrelation** function is a simple product of one function that depends only on transport coefficients and another function that depends only on the rate constants of chemical reactions that occur in the sample. This simple form should allow manageable data analyses in new FCS experiments that involve sample translation.

L6 ANSWER 14 OF 19 MEDLINE DUPLICATE 8  
 AN 88025392 MEDLINE  
 DN 88025392 PubMed ID: 3663831  
 TI Molecular aggregation characterized by high order **autocorrelation**



in fluorescence correlation spectroscopy.

AU Palmer A G 3rd; Thompson N L  
 CS Department of Chemistry, University of North Carolina at Chapel Hill  
 27514.  
 NC GM-37145 (NIGMS)  
 SO BIOPHYSICAL JOURNAL, (1987 Aug) 52 (2) 257-70.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198711  
 ED Entered STN: 19900305  
 Last Updated on STN: 19970203  
 Entered Medline: 19871127

AB The use of high order **autocorrelation in fluorescence correlation spectroscopy** for investigating aggregation in a sample that contains fluorescent molecules is described. Theoretical expressions for the fluorescence fluctuation **autocorrelation** functions defined by  $g_{m,n}(\tau) = [(\Delta F(t + \tau)\Delta F(t) - (\Delta F(t))^2)] / (F)^{m+n}$ , where  $\Delta F(t)$  is the fluorescence fluctuation at time  $t$ ,  $(F)$  is the average fluorescence, and  $m$  and  $n$  are integers less than or equal to 3, are derived. Methods for determining the number densities and relative fluorescence yields of aggregates of different sizes from a series of  $G_{m,n}(0)$  values are outlined. The method is applied to 1,1'-dioctadecyl-3,3,3',3'-tetramethylindocarbocyanine perchlorate suspended in solutions of water and ethyl alcohol. The technique presented may prove useful in detecting and characterizing aggregates of fluorescent-labeled biological molecules such as cell surface receptors.

L6 ANSWER 15 OF 19 MEDLINE  
 AN 87190203 MEDLINE  
 DN 87190203 PubMed ID: 3106023  
 TI **Fluorescence correlation spectroscopy** in the nanosecond time range: rotational diffusion of bovine carbonic anhydrase B.

AU Kask P; Piksarv P; Mets U; Pooga M; Lippmaa E  
 SO EUROPEAN BIOPHYSICS JOURNAL, (1987) 14 (4) 257-61.  
 Journal code: 8409413. ISSN: 0175-7571.  
 CY GERMANY, WEST: Germany, Federal Republic of  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198706  
 ED Entered STN: 19900303  
 Last Updated on STN: 19970203  
 Entered Medline: 19870608

AB A fluorescence correlation experiment for measurement of rotational diffusion in the nanosecond time scale is described. Using this method, the rotational diffusion coefficient of bovine carbonic anhydrase B labelled with tetramethylrhodamine isothiocyanate was estimated to be  $D_r = (1.14 \pm 0.15) \times 10^{-7} \text{ s}^{-1}$  at 22 degrees C. The experiment is based on a cw argon ion laser, a microfluorometer with local solution flow inside the sample cell, and two photon detectors. The fluorescence intensity **autocorrelation** function in the nanosecond time range is computed with the help of a time-to-amplitude converter and a multichannel pulse-amplitude analyser.

L6 ANSWER 16 OF 19 MEDLINE DUPLICATE 9  
 AN 86026651 MEDLINE  
 DN 86026651 PubMed ID: 4052573  
 TI On the rotational brownian motion of a bacterial idle motor. II. Theory of **fluorescence correlation spectroscopy**.



AU Hoshikawa H; Asai H  
 SO BIOPHYSICAL CHEMISTRY, (1985 Aug) 22 (3) 167-72.  
 Journal code: 0403171. ISSN: 0301-4622.  
 CY Netherlands  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198511  
 ED Entered STN: 19900321  
 Last Updated on STN: 19900321  
 Entered Medline: 19851125  
 AB The photon flux **autocorrelation** function of a fluorescent label attached to a bacterial motor shaft is calculated for the case in which the bacterial motor is considered to be actively but idly rotating. It is shown that even when the fluorescent label has a very short lifetime, **fluorescence correlation spectroscopy** should provide a useful tool for determining the rate of revolution of the bacterial motor under various solution conditions.

L6 ANSWER 17 OF 19 MEDLINE DUPLICATE 10  
 AN 83283675 MEDLINE  
 DN 83283675 PubMed ID: 6882857  
 TI Immunoglobulin surface-binding kinetics studied by total internal reflection with **fluorescence correlation spectroscopy**.  
 AU Thompson N L; Axelrod D  
 NC HL24039 (NHLBI)  
 NS14565 (NINDS)  
 SO BIOPHYSICAL JOURNAL, (1983 Jul) 43 (1) 103-14.  
 Journal code: 0370626. ISSN: 0006-3495.  
 CY United States  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198310  
 ED Entered STN: 19900319  
 Last Updated on STN: 19970203  
 Entered Medline: 19831008  
 AB An experimental application of total internal reflection with **fluorescence correlation spectroscopy** (TIR/FCS) is presented. TIR/FCS is a new technique for measuring the binding and unbinding rates and surface diffusion coefficient of fluorescent-labeled solute molecules in equilibrium at a surface. A laser beam totally internally reflects at the solid-liquid interface, selectively exciting surface-adsorbed molecules. Fluorescence collected by a microscope from a small, well-defined surface area approximately 5 micron<sup>2</sup> spontaneously fluctuates as solute molecules randomly bind to, unbind from, and/or diffuse along the surface in chemical equilibrium. The fluorescence is detected by a photomultiplier and autocorrelated on-line by a minicomputer. The shape of the **autocorrelation** function depends on the bulk and surface diffusion coefficients, the binding rate constants, and the shape of the illuminated and observed region. The normalized amplitude of the **autocorrelation** function depends on the average number of molecules bound within the observed area. TIR/FCS requires no spectroscopic or thermodynamic change between dissociated and complexed states and no extrinsic perturbation from equilibrium. Using TIR/FCS, we determine that rhodamine-labeled immunoglobulin and insulin each nonspecifically adsorb to serum albumin-coated fused silica with both reversible and irreversible components. The characteristic time of the most rapidly reversible component measured is approximately 5 ms and is limited by the rate of bulk diffusion. Rhodamine-labeled bivalent antibodies to dinitrophenyl (DNP) bind to DNP-coated fused silica virtually irreversibly. Univalent Fab fragments of these same antibodies appear to specifically bind to

DNP-coated fused silica, accompanied by a large amount of nonspecific binding. TIR/FCS is shown to be a feasible technique for measuring absorption/desorption kinetic rates at equilibrium. In suitable systems where nonspecific binding is low, TIR/FCS should prove useful for measuring specific solute-surface kinetic rates.

L6 ANSWER 18 OF 19 MEDLINE DUPLICATE 11  
 AN 81063249 MEDLINE  
 DN 81063249 PubMed ID: 6254568  
 TI The use of **fluorescence correlations spectroscopy** to probe chromatin in the cell nucleus.  
 AU Sorscher S M; Bartholomew J C; Klein M P  
 SO BIOCHIMICA ET BIOPHYSICA ACTA, (1980 Nov 14) 610 (1) 28-46.  
 Journal code: 0217513. ISSN: 0006-3002.  
 CY Netherlands  
 DT Journal; Article; (JOURNAL ARTICLE)  
 LA English  
 FS Priority Journals  
 EM 198102  
 ED Entered STN: 19900316  
 Last Updated on STN: 19900316  
 Entered Medline: 19810226  
 AB All systems in thermodynamic equilibrium are subject to spontaneous fluctuations from equilibrium. For very small system, the fluctuations can be made apparent, and can be used to study the behavior of the system without introducing any external perturbations. The mean squared amplitude of these fluctuations contains information about the absolute size of the system. The characteristic time of the fluctuation **autocorrelation** function contains kinetic information. In the experiments reported here, these concepts are applied to the binding equilibrium between ethidium bromide and DNA, a system where the fluorescence properties of the dye greatly enhance the effect of spontaneous fluctuations in the binding equilibrium. Preliminary experiments employ well-characterized DNA preparations, including calf thymus DNA, SV40 DNA, and calf thymus nucleohistone particles. Additional measurements are described which have been made in small regions of individual nuclei, isolated from green monkey kidney cells, observing as few as 5000 dye molecules. The data indicate that the strength of dye binding increases in nuclei isolated from cells which have been stimulated to enter the cell growth cycle. The viscosity of nuclear material is inferred to be between one and two orders of magnitude greater than that of water, and it decreases as the cells leave the resting state and enter the cell growth cycle. Washing the nuclei also lowers the viscosity. These experiments demonstrate that **fluorescence correlation spectroscopy** can provide information at the subnuclear level that is otherwise unavailable.

L6 ANSWER 19 OF 19 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.  
 AN 1980:176865 BIOSIS  
 DN BA69:51861  
 TI MOTION OF MYOSIN FRAGMENTS DURING ACTIN ACTIVATED ATPASE  
**FLUORESCENCE CORRELATION SPECTROSCOPY STUDY.**  
 AU BOREJDO J  
 CS POLYMER DEP., WEIZMANN INST. SCI., REHOVOT, ISR.  
 SO BIOPOLYMERS, (1979) 18 (11), 2807-2820.  
 CODEN: BIPMAA. ISSN: 0006-3525.  
 FS BA; OLD.  
 LA English  
 AB The rates of the translational motion of myosin fragments, heavy meromyosin (HMM), and heavy meromyosin subfragment-1 (HMM S-1) were measured during actin-activated ATPase reaction by the method of **fluorescence correlation spectroscopy**. This technique monitors the random fluctuations in the concentration of fluorescent molecules in an open volume which result from the

translational diffusion of the molecular species under observation. The statistical behavior of the fluctuations is represented in the form of the autocorrelation function, which is related to the translational diffusion coefficient of the fluorescent molecules. The translational motion of fluorescently labeled myosin fragments was progressively slowed down after additions of increasing amounts of actin in the presence of excess MgATP. When these results are interpreted according to a simple binding scheme, the extent of the retardation can be used to obtain the apparent association constant for binding of S-1 and HMM to actin in the presence of MgATP. In 0.1 M KCl and at 23.degree. C, the apparent association constants were determined as **GRAPHIC** = 2.2 .times. 10<sup>4</sup> M<sup>-1</sup> and **GRAPHIC** = 8.8 .times. 10<sup>3</sup> for HMM and S-1, respectively.

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